FOR YOUR

APPLE II

PRT-I PARALLEL PRINTER CARD

Installation

and

Instruction Manual

PROMETHEUS

PROMETHEUS PRODUCT WARRANTY AND REGISTRATION CARD

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PRODUCT _____ SERIAL # _____

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PROMETHEUS PRODUCT WARRANTY AND REGISTRATION CARD

I. INTRODUCTION

The Prometheus PRT-1 Parallel Printer Interface board provides the Apple user with an intelligent parallel interface to most of today's popular dot-matrix printers. These include the Epson, C-ITOH, NEC, OKI-DATA, ANADEX , just to name a few. PRT-1 is shipped configured for the Centronics standard and can easily be configured for other standards.

The PRT-1 contains on-board firmware to allow maximum flexibility in interfacing to most any printer. Advanced features including video ON or OFF, disable or enable auto line feed, clear or set the 8th bit of the output character, set left margins, set page length, and set line length are all provided in the standard firmware which can be invoked by a few simple keystrokes or commands.

With the graphics firmware option, the PRT-1 provides sophisticated on board firmware for the Apple high resolution graphics. These graphic printing routines are easily accessed by a few simple keyboard commands. No need to load software routines to print high resolution bit image graphics. No need to worry about memory conflicts between the software routines and your program. In addition to the high resolution graphics routines, the graphics firmware option also provides a text screen dump routine that will allow the user to print the contents of the text screen, and send 'escape' characters to your printer using control characters.

The PRT-1 is fully compatible with Apple CP/M and Apple Pascal (or Fortran) when the PRT-1 is installed in slot number 1 in your Apple computer.

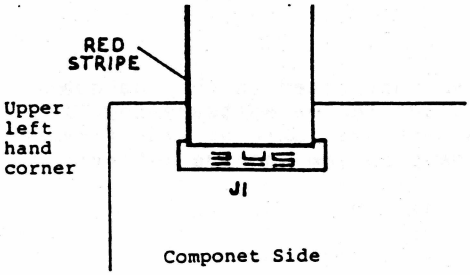
II. INSTALLATION

The PRT-1 is shipped configured for the Centronics standard and can be used to interface directly with any Centronics compatible printer immediately. If your printer is not Centronics compatible, consult the Section on Hardware and Appendix A in this manual on how to configure PRT-1 for your printer.

Once the PRT-1 is configured (if necessary), install the PRT-1 board into any one of the eight peripheral slots in your Apple except slot number 0 (slot 0 is reserved for memory expansion interface or language card interface). It is suggested that the PRT-1 be installed in slot number 1 since most software packages will recognize the board as the printer interface when installed in this slot, especially Apple CP/M or Apple Pascal (or Fortran).

To install the PRT-1 board, make sure the power to your Apple is turned OFF. Installing the board with the power ON will damage the Apple mother board as well as the PRT-1. Remove the cover from the Apple by pulling up the cover at the rear slightly and slide the cover backward until the inside of your Apple is exposed. There is a series of eight long sockets along the rear edge of the mother board. Slot number designations are printed on the Apple's mother board along the back edge near the cutouts in the case. The leftmost slot (the slot closest to the power supply) is slot 0. The slot adjacent to it is slot 1. This is the slot where most software packages expect a printer interface to be in. Insert the board into the slot with a gentle rocking motion until it is fully seated. The side with all the electronics circuit chips should face to the right away from the power supply. As a matter of fact, you will not be able to install the board backward since the board is designed with an oversized left edge so that you won't be able to insert the board connector into the slot backwards.

To install the cable, plug the 20 pin connector to the 20 pin header labelled J1 near the top of the board. The red stripe on the cable ribbon should be to the left closest to the edge of the board towards the Apple keyboard as shown in the figure below. Appendix A contains detailed information on pin numbering and cable placement. Pass the cable through one of the vertical cutouts in the rear of the Apple case. Replace the Apple's cover by sliding the front edge of the cover into place and then press down the rear edge until it snaps into place.The other end of the cable terminates into a 36 pin microribbon connector that is Centronics compatible. The 36 pin connector should plug directly into the 36 pin mating connector on the back of your printer. The connector is wider on one end so that it will only fit into your printer one way.



CABLE PLACEMENT ON PRT-1

CABLE PLACEMENT ON PRT-1

A simple test to check out the installation is by turning ON the power to your Apple. The Apple II message should appear at the top of the screen with a beep and followed by a Basic prompt. If you don't hear the beep or see a prompt, turn OFF your Apple immediately and check your installation carefully. The PRT-1 is tested at the factory before it is shipped (see the section on warranty for service). If everything works fine, power up your printer and type PR#1 (if you have installed the PRT-1 in slot 1) or PR#n (n is the slot number where you installed the PRT-1) and a carriage return. The printer should carriage return and print the Basic prompt character. If this does not happen, make sure your printer is ON line (or SELect for some printers) and that all connections have been firmly made.

Once you have directed output to your printer by the PR#n command, all data that would normally be output to the screen will be sent to your printer as well. The PRT-1 will echo characters to the screen while the printer is printing the data unless the software command to turn off the video is issued. All the commands that are provided by the PRT-1 are contained in the Software section in this manual.

III. HARDWARE

For those of you that are not so interested in the hardware details about the PRT-1, skip to the section on software and find out about the software routines that are available at your finger tips in using the PRT-1. For the rest of you who are interested in hardware, please read on.

1. Jumper Selection

Jumpers JH1 and JH2 on the board are the only hardware selections that can be selected on the PRT-1. They are set to interface with most of today's popular dot matrix printers. JH1 is the acknowledge polarity jumper. JH2 is the strobe polarity jumper. See Appendix A for more details.

2. Strobe Polarity - JH2 jumper

The JH2 jumper is the strobe polarity jumper. It is used to set the polarity of the strobe signal. The strobe signal tells the printer that there is valid data on the parallel data lines. Position A is the top most position near the label J1. Setting the jumper in this position will produce a negative strobe pulse for 1 microsecond. Position B (bottom position) produces a positive pulse for 1 microsecond. Most Centronics interfaces require the 'B' position and this is the position JH2 is set at the factory when shipped. See Appendix A for more information and timing diagrams.

3. Acknowledge Polarity - JH1 jumper

The JH1 jumper is the acknowledge polarity jumper. It is used to set up the PRT-1 for the polarity of the acknowledge signal sent from the printer. The acknowledge signal is used to tell the PRT-1 that the printer has accepted data and is ready to accept more data. JH1 sets up the polarity that the PRT-1 will respond to. With JH1 set to A (leftmost) position, the PRT-1 will respond to a 1 to 0 transition (falling edge of a positive pulse) on the acknowledge line. With the JH1 set to B position (rightmost), the PRT-1 will respond to a 0 to 1 transition (rising edge of a negative pulse) on the acknowledge line. JH1 is set at 'B' position at the factory when shipped for Centronics compatibility. Position B should also be used if there is no printer connected as the acknowledge line will float high to it's non-active state. See Appendix A for more information and timing diagrams.

IV. SOFTWARE

1. Default Conditions

The standard software routines provided by the PRT-1 are contained in the 2716 EPROM (erasable programmable read-only memory) chip. Upon initialization (such as by issuing a PR#n command in Basic), the PRT-1 is set to certain default conditions. These conditions are set to allow compatibility with most peripheral devices and software packages. Table 4-1 lists the default conditions set by the PRT-1 upon initialization.

OPTIONS	PARALLEL	COMMENTS
Auto line feed	ON	disable the AUTO LF after CR on your printer
8th Bit (MSB)	Clear	8th bit always sets to 0 when outputting data
Apple Video	ON	output echoes on the screen
Paging	OFF	prints continuously
Line length	255	sets line length to 255 characters per line
Left margin	0	sets left margin at column 0
Lead-in character	^I	control-I as the lead-in character

Table 4-1 Defaults

These conditions are set to their default values when output is first invoked. Output/Input is invoked by the PR#n from Basic or n^P from the monitor where n is the slot number that the PRT-1 is installed. Reference to $Cn00 (hexidecimal) from assembly language will also initialize the peripheral driver to it's default conditions.

The PRT-1 can be set up for different default conditions by modifying certain routines in the 2716 EPROM. To modify the 2716 EPROM, you will need a 2716 EPROM eraser and programmer and some knowledge about 6502 assembly language. If you do not feel confident enough to do so, we at Prometheus will be happy to modify the 2716 EPROM for you with your desired default conditions. Please contact us should you want more information. We are working very hard to support our products.

2. Standard Options

The standard firmware for the parallel driver is designed to allow easy interfacing with most peripheral devices. In the Apple memory, this driver will show up at $CnOO (hexidecimal) where n is the slot number that the peripheral interface is in. The PRT-1 firmware (in the 2716 EPROM) utilizes the $C800 to $CFFF (hexidecimal) memory space in the Apple. Refer to your Apple II Reference Manual for more detail regarding the peripheral card I/O and ROM space.

Table 4-2 lists the standard firmware options available for the parallel driver.

CHARACTER	ACTION
*	
I	Video ON - echoes output on the screen
E	Enable auto line feed - default condition
K	Kill auto line feed - disable auto line feed
C	Clear the 8th bit of output data - default
H	High (8th) bit set of output data
nL	sets Left margin at column n - default=0
nN	sets line length to n - default=255
nP	sets Page length to n - default is continuous

* Video is automatically turned OFF when the line length is set to greater than 40 characters per line.

Table 4-2 Standard Options

Changing the default conditions of the options requires a command to be sent to the interface. In order for the interface to differentiate between data and a command, a 'lead-in' character is needed to prepare the interface to accept commands. The standard or default lead-in character is ^I (control-I is entered by holding the CTRL key and the I key down simultaneously). Incidentally, the lead-in character can be changed to another control character as the lead-in character. Hence, changing the option default will require you to key in the lead-in character first followed by the appropriate option characters. For example, changing the line length to 80 columns per line of output will require you to type in ^I80N and a carriage return (of course). Following is the detailed description of each option:

CHANGING LEAD-IN CHARACTER - The lead-in character can be changed by typing in another control character after the current

lead-in character. The default lead-in character is ^I. If you want to change the lead-in character to ^Y for Apple Pascal or for other reasons, you would type in ^I^Y and a carriage return. Now, the lead-in character is ^Y. To change it back to ^I later, type in ^Y^I. And that's it.

AUTO LINE FEED - The PRT-1 inserts a LINE FEED character automatically after every CARRIAGE RETURN character sent to it if this option is 'enabled'. This is the default setting of the PRT-1. For proper operation of your printer connected to the PRT-1, set the AUTO LINE FEED switch to OFF in your printer. Check your printer manual for setting the switch. To kill (disable) the auto line feed capability of the PRT-1, type in ^IK <cr> assuming the current lead-in character is ^I (<cr> denotes a carriage return).

VIDEO OUTPUT - As you may have noticed, the only option for video output is to turn ON the video and there is no option available to turn it OFF. For most cases, video ON is more desirable since output is echoed to your Apple screen while the printer is busy printing. However, by setting the line length using the nN command (will be described shortly) to more than 40 characters per line, the video is automatically turned OFF.

8TH BIT - The 8th bit is also commonly called the most significant bit of the data byte. One byte of data has eight bits, namely bit 0 to bit 7, and bit 7 is the most significant bit. Most printers use only seven bits of data for output and use the most significant bit for block graphics (refer to your printer manual for more details). By clearing or setting the 8th bit, you can select the printer to print regular ASCII characters or block graphics characters (or foreign characters on some printers). The default setting is 8th bit cleared. Therefore, when data is sent to the printer the 8th bit is always set to 0. To set the 8th bit (=1), type in ^IH <cr>. To clear the 8th bit again, type in ^IC<cr>.

LEFT MARGIN - The default left margin for printing is at column 0 (leftmost column). To change the left margin, type in ^InL<cr> where n is the column number. For example, to set the left margin at column 10, type in ^I10L<cr>. This will remain in effect until another left margin command is issued or your computer is turned OFF. Valid column number for the left margin ranges from 0 to 255 but your printer may not be able to handle all possible left margin settings.

LINE LENGTH - The default is 255 characters per line. The line length can be set to any value from 1 to 255. Most terminals and printers will insert a linefeed after carriage return when their maximum line width is exceeded. To change the line length, type in ^InN where n is the width ranging from 1 to 255. If the line length is set to more than 40 characters per line, the video is turned OFF automatically (see VIDEO OUTPUT above). But when the line length is set at less than or equal to 40 characters, the video will be turned back ON automatically.

APPENDIX A

PARALLEL INTERFACE

The PRT-1 parallel interface is configured for a standard Centronics type of printer interface at the factory. If your printer is a Centronics type printer, no reconfiguration is necessary. The 20-pin connector of the cable should attach to the 20-pin header marked J1 on the upper left edge of the PRT-1. The signals and pin out of the PRT-1 are listed below:

J1 PIN#	CENTRONICS PIN#	SIGNAL DESCRIPTION
1,20	16	Ground
2	10	Acknowledge
8	1	Strobe
10	2	Data Bit 0
11	3	Data Bit 1
12	4	Data Bit 2
13	5	Data Bit 3
14	6	Data Bit 4
15	7	Data Bit 5
16	8	Data Bit 6
17	9	Data Bit 7
N.C.	11	Busy

Centronics pin #11, the 'busy' line, is not connected to any input on the PRT-1. It is only included above for reference.

The Centronics pin numbers listed above are the same numbers that can be found on the connector plug at the printer end of the cable. A compatible connector, Amphenol #57-30360 36-pin male microribbon connector or equivalent, is used to connect to the printer.

The signal levels sent and received by PRT-1 are standard TTL level signals, and require no special intermediate circuitry such as pull-ups or pull-downs to operate with most printers. The pin numbering is shown below:

J1 PIN OUT:

J1

APPENDIX A (CONTINUED)

The two user selectable options are the strobe polarity and the acknowledge polarity. The jumper labelled JH2 is the strobe polarity jumper and the jumper labelled JH1 is the acknowledge polarity jumper. These jumpers can be set differently to meet various interface needs of printers other than Centronics type.

STROBE POLARITY - JH2: The strobe pulse on the PRT-1 is one microsecond long. Setting the JH2 jumper plug to the top position (position A) results in a negative strobe pulse appearing on the strobe line of the interface. Putting the JH2 jumper plug in position B results in a positive strobe pulse instead.

ACKNOWLEDGE POLARITY - JH1: The JH1 jumper is used to select the response characteristics of the busy circuitry onboard. For fast pulses, this jumper can be set at either position. But for pulses of long duration such as busy signals, the position of JH1 is important. A busy line can be interfaced to the printer circuitry if the printer does not have an acknowledge line. The busy line on a printer usually goes TRUE when the printer cannot accept data (such as during a carriage return) and goes FALSE when the printer is ready to accept another character. This is different than the acknowledge pulse where the printer does nothing after the strobe pulse is sent to it. Instead, when the printer has accepted the data sent to it, it sends out a pulse to PRT-1. For negative acknowledge pulses and negative true busy lines (READY lines), JH1 should be set at the rightmost position - position B. This is the position that is set at the factory. For positive acknowledge pulses and positive true BUSY lines, JH1 should be set to the leftmost position - position A.

NOTES

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Dear User,

The new PRT-1 board has been revised. Jumper JH1 and JH2 are no longer needed even though they are pictured on the actual circuit card.

Please disregard all references to JH1 and JH2 in this manual.

Regards,

Prometheus Products, Inc.